

## DATE

September 15 - 16, 2020

## REGISTRATION

Online only: <https://iwcb2020.besl-eventservice.de>

## REGISTRATION FEE - ONLINE PARTICIPATION

Due to the pandemic and the local regulations, we have decided to hold the event exclusively virtually.

### Early Bird online (ends on August 15, 2020)\*\*

Regular participant (without presentation) € 190,00

Student\* (without presentation) € 40,00

\*\*This special rate applies also to confirmed presenters taking part online analogue to the onsite participation until September 14, 2020.

### Regular online (ends on September 14, 2020)

Regular Participant (without presentation) € 220,00

Student\* (without presentation) € 60,00

\*Student: Please note that during the registration process, students will be asked to upload a proof of their status (for example, a valid student ID) as a method of verification.

## MOTIVATION

The 2nd International Workshop on Carnot Batteries will bring together experts in energy storage, in particular thermal energy storage, to discuss the state of the art of research and demonstration of Carnot batteries. In a two-day lecture programme, a broad overview of innovative research approaches will be provided, and topics of different Carnot battery concepts and their demonstration and integration into the power grid and sector coupling will be addressed. The workshop serves as an international platform to present latest results in Carnot batteries research and make them internationally visible.

## CONTACT

Chairman:



André Thess, DLR and University of Stuttgart

Co-Chairman:

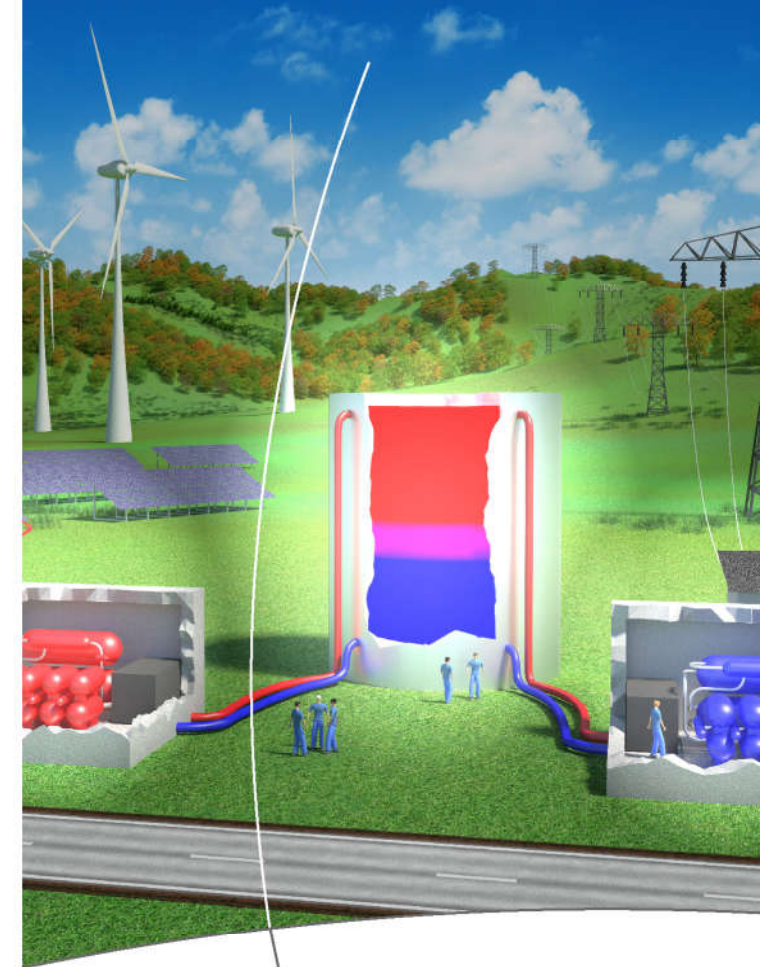


Thomas Wetzel, Karlsruhe Institute of Technology

Head of Organizing Committee:



Henner Kerskes, University of Stuttgart  
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# Power-Heat-Power

## 2. International Workshop on Carnot Batteries

September 15 - 16, 2020

Stuttgart, Germany



Universität Stuttgart



Deutsches Zentrum für Luft- und Raumfahrt German Aerospace Center

# 2. International Workshop on Carnot Batteries 2020

## DAY 1 - TUESDAY, 15.09.2020

- 09.00 am **O P E N I N G**
- 09.15 am Introduction to the Workshop  
André Thess, DLR, Germany
- 10.00 am Sector Coupling: the Essential Key to Decarbonization  
Patrik Meli, MAN Energy Solutions AG, Switzerland
- 10.30 am TBA  
Reinhold Elsen, RWE Power AG & TU Darmstadt, Germany
- 11.00 am The Low Temperature (80-120 °C) Carnot Battery and its Potential for the Integrated Energy System  
Joachim Karthäuser, Climeon, Sweden
- 11.30 am **C O F F E E B R E A K**
- 12.00 pm First Experimental Results of a Thermally Integrated Carnot Battery Using a Reversible Heat Pump/Organic Rankine Cycle  
Vincent Lemort/Olivier Dumont, University of Liège, Belgium
- 12.30 pm Thermal Energy Storage for a Net (Nearly Net) Zero Carbon Energy Future  
Yulong Ding, University of Birmingham, United Kingdom
- 01.00 pm **L U N C H**
- 02.00 pm BatMarines  
Andreas Class, Karlsruhe Institute of Technology, Germany
- 02.20 pm Efficiency of a Carnot Battery with Horizontal Flow Packed Bed Thermal Storage  
Michael von der Heyde, Hamburg University of Technology, Germany
- 02.40 pm Design and Built of a First Laboratory CHEST Systeme  
Thilo Weller, DLR, Germany
- 03.00 pm Techno-Economic Assessment of a Combined Power-to-Heat-to-Power Energy Storage Coupled with a District Heating System  
Sven Stark, University of Stuttgart, Germany
- 03.20 pm The Brayton Cycle as Support Tool for Rankine and Liquid Air Batteries  
Pau Farres-Antunez, University of Cambridge, United Kingdom
- 03.40 pm **C O F F E E B R E A K**
- 04.00 pm Batch Processes in Heat Engines: Theory and First Initiatives  
Michael Löffler, Engineering Office, Germany

- 04.20 pm Development and Simulation of a High-Temperature Heat Pump Based on the Reverse Brayton Cycle  
Göksel Özüylasi, DLR, Germany
- 04.30 pm 100-GWh Heat Storage with Crushed Rock and Oil or Nitrate Salt Heat Transfer for Heat Generating Systems and Carnot Storage  
Charles Forsberg, Massachusetts Institute of Technology, United States.
- 04.40 pm Dynamic Simulation of a Packed Bed Thermal Energy Storage System: Validation und Use Case  
Kai Knobloch, Hamburg University of Technology, Germany
- 04.50 pm Adsorption Heat Storage: State of the Art and Future Perspectives  
Salvatore Vasta, Italian National Research Council, Italy
- 05.00 pm Applications of Thermal Energy Storage for Grid Electric Storage  
Zhiwen Ma, National Renewable Energy Laboratory (NREL), United States
- 05.30 pm **C L O S I N G F O R T H E D A Y**

## DAY 2 - WEDNESDAY, 16.09.2020

- 09.00 am **O P E N I N G**
- 09.30 am TBA  
TBA
- 10.00 am Experimental results and modelling of a grid-scale Pumped Heat Energy Storage demonstrator  
Andrew Smallbone, University of Durham, United Kingdom
- 10.30 am Decarbonization of coal-fired power plants with Carnot Batteries – Results from a feasibility study on decarbonization of the Chilean power sector  
Michael Geyer, DLR, Germany
- 11.00 am Experimental Results for a Medium-Scale Rock Bed Thermal Energy Storage  
Kurt Engelbrecht, Technical University of Denmark, Denmark
- 11.30 am **C O F F E E B R E A K**
- 12.00 pm Numerical Study of Metal-Based Micro Encapsulated Phase Change Material for High-Temperature Heat Storage System  
Hiroaki Koide, Hokkaido University, Japan

- 12.20 pm Research on a Carnot Battery and a Supercritical Carbon Dioxide Power Cycle in KIER  
Junhyun Cho, Korea Institute of Energy Research, South Korea
- 12.40 pm Malta Pumped Heat Electricity Storage Pilot at Brainery Park in Jülich  
Janina Hippler-Nettlau, Malta Inc., United States
- 01.00 pm **L U N C H**
- 02.00 pm High-Temperature Storage with Liquid Metals – Design of a Prototype Storage System and Material Testing  
Klarissa Niedermeier, KIT, Germany
- 02.20 pm Thermodynamic Design and Optimisation of Pumped Thermal Electricity Storage (PTES) Systems Based on Transcritical Rankine Cycles  
Yongliang Zhao, Imperial College London, United Kingdom
- 02.40 pm Heat Transformation and Storage Facility – Efficiency Enhancement of Transcritical CO<sub>2</sub> Heat Pump by Coupling to Adsorption Unit and Storage Integration  
Ferdinand Schmidt, KIT, Germany
- 03.00 pm Low Temperature Pumped Thermal Energy Storage with Kalina Cycles  
Antoine Koen, University of Cambridge, United Kingdom
- 03.20 pm Power-to-Heat Integration in Brayton Battery: Increasing System Cost Efficiency and Flexibility  
Sergej Belik, DLR, Germany
- 03.40 pm **C O F F E E B R E A K**
- 04.00 pm Role of High Temperature Carnot Batteries in Sector Coupling  
Louisa Schmeken, Steinmüller Engineering, Germany
- 04.20 pm DOE's Energy Storage Grand Challenge and the Integration of Energy  
Briggs White, US Department of Energy, United States
- 04.40 pm Where are the Carnot Batteries?: A Discussion on the Design Decisions that Influence Technology Deployment  
Adrienne Little, United States
- 05.00 pm **C L O S I N G**